

Appln No. 09/880,714

Amdt date June 3, 2005

Reply to Office action of December 3, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A network node for use in a WDM communications network, the network node comprising:

- a first network interface unit arranged, in use, to demultiplex an incoming WDM optical signal and to convert the incoming WDM optical signal into a plurality of electrical channel signals,

- a regeneration unit for regenerating the electrical channel signals utilising at least 2R regeneration, the regeneration unit comprising a 3R regeneration element and a bypass connection for the 3R regeneration element for 2R regeneration;

- a second network interface unit arranged, in use, to convert and multiplex at least one of the electrical channel signals into an outgoing WDM optical signal, and

- a secondary interface unit arranged, in use, to convert at least one of the electrical channel signals into an optical signal and to drop the optical signal at the network node;

wherein the network node further comprises an electrical ~~switching unit~~ arranged, in use, to facilitate any one of the electrical channel signals to be selectively converted and dropped at the network node via the secondary interface unit, or converted and multiplexed into the outgoing WDM signal via the second network interface unit; and

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wherein the electrical switching ~~unit~~ is capable of simultaneously switching electrical channel signals having different data-protocols with different data-rates received at respective ports of the electrical switch.

2. (Original) A network node as claimed in claim 1, wherein the secondary interface unit is further arranged, in use, to receive at least one single wavelength optical signal and to convert it into a corresponding electrical signal, and the second network interface unit is further arranged to convert and multiplex the corresponding electrical signal into the outgoing WDM optical signal.

3. (Original) A network node as claimed in claim 2, wherein the secondary interface unit is arranged, in use, to regenerate the corresponding electrical signal utilising at least 2R regeneration.

4. (Canceled)

5. (Original) A network node as claimed in claim 1, wherein the first network interface unit comprises at least one trunk interface card for converting respective channels of the incoming WDM optical signal into the electrical channel signals.

6. (Original) A network node as claimed in claim 1, wherein the second network interface unit comprises at least one trunk interface card for converting the respective electrical

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channel signals into optical channel signals for multiplexing into the outgoing WDM optical signal.

7. (Original) A network node as claimed in claim 1, wherein the secondary interface unit comprises at least one secondary interface card for converting respective electrical channel signals into optical signals for dropping at the network node and for converting respective received single wavelength signals for multiplexing into the outgoing optical WDM signal.

8. (Previously Presented) A network node as claimed in any one of claims 5, 6, or 7, wherein the switching unit is arranged in a manner such that, in use, any one or more of the trunk or secondary interface cards can be selectively connected to any one or more of the trunk or secondary interface cards.

9. (Original) A network node as claimed in claim 1, wherein the regeneration unit is arranged to regenerate the electrical channel signals utilising 3R regeneration.

10. (Original) A network node as claimed in claim 9, wherein the regenerating unit comprises a programmable Clock Data Recovery (CDR) component for each electrical channel signal.

11. (Original) A network node as claimed in claim 1, wherein the first and second network interface units are capable, in use, of functioning as the other network interface

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unit, whereby the network node is west-east/east-west traffic transparent.

12. (Original) A network node as claimed in claim 11, wherein the first and second network interface units each comprise a passive WDM multiplexing/demultiplexing component.

13. (Original) A network node as claimed in claim 12, wherein the WDM components are arranged as coarse WDM (CWDM) components.

14. (Previously Presented) A network node as claimed in claim 1, wherein the switching unit is incorporated in one of the first or second network interface units.

15. (Original) A network node as claimed in claim 14, wherein a redundant switching unit is incorporated in the other network interface unit for failure protection.

16. (Original) A network node as claimed in claim 1, wherein the regeneration unit is implemented as a very large scale integration (VLSI) structure.

17. (Currently Amended) A network node for use in a WDM communications network, the network node comprising:

- a first network interface unit arranged, in use, to demultiplex an incoming WDM optical signal and to convert the

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incoming WDM optical signal into a plurality of electrical channel signals,

- a regeneration unit for regenerating the electrical channel signals utilising at least 2R regeneration, the regeneration unit comprising a 3R regeneration element and a bypass connection for the 3R regeneration element for 2R regeneration;

- a second network interface unit arranged, in use, to convert and multiplex at least one of the electrical channel signals into an outgoing WDM optical signal, and

- a secondary interface unit arranged, in use, to receive at least one single wavelength optical signal and to convert it into a corresponding electrical signal,

and the second network interface unit is further arranged to convert and multiplex the corresponding electrical signal into the outgoing WDM optical signal;

wherein the network node further comprises an electrical ~~switching unit~~ arranged, in use, to facilitate any one of the electrical channel signals and the corresponding electrical signal to be selectively converted and multiplexed into the outgoing WDM signal via the second interface unit; and

wherein the electrical ~~switching unit~~ is capable of simultaneously switching electrical channel signals and corresponding electrical signals having different data-protocols with different data-rates received at respective ports of the electrical switch.

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18. (Original) A WDM network incorporating at least one network node as defined in claims 1 or 17.

19. (Currently Amended) A method of transmitting communication data in a WDM communications network, the method comprising the steps of, at a network node of the WDM communications network:

- demultiplexing an incoming WDM optical signal
- converting the incoming WDM optical signal into a plurality of electrical channel signals,
- regenerating the electrical channel signals utilising ~~at least 2R regeneration~~ a regeneration unit, the regeneration unit comprising a 3R regeneration element and a bypass connection for the 3R regeneration element for 2R regeneration;
- converting and multiplexing at least one of the electrical channel signals into an outgoing WDM optical signal,
- converting at least one of the electrical channel signals into an optical signal;
- dropping the optical signal at the network node; and
- ~~switching the electrical channel signals utilizing an electrical switching unit,~~ wherein any one of the electrical channel signals are selectively ~~converted and~~ dropped at the network node, or ~~converted and~~ multiplexed into the outgoing WDM optical signal, and wherein the ~~switching unit~~ is capable of simultaneously switching electrical channel signals having different data-protocols with different data-rates received at respective ports of the electrical switch.

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20. (Currently Amended) A method of transmitting communication data in a WDM communications network, the method comprising the steps of, at a network node of the WDM communications network:

- demultiplexing an incoming WDM optical signal
- converting the incoming WDM optical signal into a plurality of electrical channel signals,
- regenerating the electrical channel signals utilising ~~at least 2R regeneration~~ a regeneration unit, the regeneration unit comprising a 3R regeneration element and a bypass connection for the 3R regeneration element for 2R regeneration;

- converting and multiplexing at least one of the electrical channel signals into an outgoing WDM optical signal,

- receiving at least one single wavelength optical signal,
- converting it into a corresponding electrical signal,
- converting and multiplexing the corresponding electrical signal into the outgoing WDM optical signal, and

switching the electrical channel signals utilizing an electrical ~~switching unit~~, wherein any one of the electrical channel signals and the corresponding electrical signal are selectively ~~converted and multiplexed~~ into the outgoing WDM optical signal, and wherein the electrical ~~switching unit~~ is capable of simultaneously switching electrical channel signals and corresponding electrical signals having different data-protocols with different data-rates received at respective ports of the electrical switch.

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21. (Previously Presented) A network node as claimed in claim 11, wherein the secondary interface unit is further arranged, in use, to receive at least one single wavelength optical signal and to convert it into a corresponding electrical signal, and the first and second network interface units are further arranged to convert and multiplex the corresponding electrical signal into outgoing WDM optical signals.

22. (Currently Amended) A WDM network comprising a plurality of network nodes, each network node comprising:

- a first network interface unit arranged, in use, to demultiplex an incoming WDM optical signal and to convert the incoming WDM optical signal into a plurality of electrical channel signals,

- a regeneration unit for regenerating the electrical channel signals utilising at least 2R regeneration, the regeneration unit comprising a 3R regeneration element and a bypass connection for the 3R regeneration element for 2R regeneration;

- a second network interface unit arranged, in use, to convert and multiplex at least one of the electrical channel signals into an outgoing WDM optical signal, and

- a secondary interface unit arranged, in use, to convert at least one of the electrical channel signals into an optical signal and to drop the optical signal at the network node;

wherein the network node further comprises an electrical ~~switching unit~~ arranged, in use, to facilitate any one of the electrical channel signals to be selectively ~~converted and~~

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dropped at the network node via the secondary interface unit, or ~~converted and~~ multiplexed into the outgoing WDM signal via the second network interface unit; and

wherein the electrical switching ~~unit~~ is capable of simultaneously switching electrical channel signals having different data-protocols with different data-rates received at respective ports of the electrical switch;

and wherein the network is capable of carrying the same electrical channel signal on different wavelengths between different network nodes.

23. (Previously Presented) A network node as claimed in claim 1, wherein the wavelength of the optical signal dropped at the network node is different from the wavelength of a corresponding optical channel signal received at the first network interface.